has antiviral activity, whereupon administration of the antiviral effective amount of the antiviral agent, the viral infection of the host is inhibited.

The Pending Claims

Claims 20-27 are currently pending and are directed to the method of inhibiting therapeutically or prophylactically a viral infection of a host. For the convenience of the Examiner, a set of pending claims is submitted herewith.

Discussion of Amendment to the Drawings

Figure 10 has been amended in accordance with the comments of the Draftsperson. Submitted herewith is a substitute Figure 10, which serves to replace existing Figure 10, as well as a document setting forth the exact changes to the figure. No new matter has been added by way of this amendment.

The Office Action

The Office has rejected claims 20-27 under 35 U.S.C. § 112, first paragraph. Reconsideration of this rejection is hereby requested.

Discussion of Rejection under 35 U.S.C. § 112, first paragraph

Claims 20-27 have been rejected under Section 112, first paragraph, for alleged lack of enablement. The Office contends that the instant specification does not sufficiently establish that the method of the present invention can be used as claimed. In particular, the Office alleges that the *in vitro* assay provided in the specification does not correlate with *in vivo* efficacy of the present inventive method. In addition, the Office cites Fahey et al. (*Clin. Exp. Immunol.*, 88(1), 1-5 (1992)) as allegedly teaching that viral infections are refractory to anti-viral therapies. The Office concludes that antiviral therapies are unpredictable and that undue experimentation would be required to practice the present invention. This rejection is traversed for the reasons set forth below.

The present invention is directed to a method of inhibiting therapeutically or prophylactically a viral infection of a host. The method comprises administering to the host an antiviral effective amount of an isolated and purified antiviral agent selected from the group consisting of an antiviral protein, an antiviral peptide, an antiviral protein conjugate, and an antiviral peptide conjugate. The antiviral protein or antiviral peptide is encoded by an isolated and purified nucleic acid molecule encoding at least nine contiguous amino acids of SEQ ID NO: 2. The at least nine contiguous amino acids of SEQ ID NO:2 have antiviral activity. Upon administration of the antiviral effective amount of the antiviral agent, the viral infection of the host is inhibited.

One of ordinary skill in the art, upon reading the specification, would be able to make and use the present inventive method with a reasonable expectation of success. Methods of isolating or recombinantly producing the antiviral proteins, antiviral peptides, antiviral protein conjugates, and antiviral peptide conjugates are provided in the specification at, for instance, page 10, line 25, through page 11, line 22, page 15, line 5, through page 16, line 10, page 16, line 18, through page 17, line 23, and page 18, lines 24-36, and Examples 1-4. The specification further discloses effective concentrations of the proteins and peptides to be used in the present inventive method and correlates those concentrations with antiviral activity in an assay widely accepted by those of ordinary skill in the art as reasonably predictive of *in vivo* utility in a host. Appropriate routes of administration are described in the specification at, for example, page 37, line 16, through page 41, line 3. Thus, the instant specification provides sufficient guidance to enable the ordinarily skilled artisan to practice the method of the present invention.

The Office contends that the instant specification does not sufficiently establish that the method of the present invention can be used as claimed. Applicant notes that the present inventive method is directed to a method of *inhibiting* a viral infection. One of ordinary skill in the art would readily appreciate that any degree of inhibition of a viral infection would be useful in the context of prophylactic and therapeutic treatment. Evidence of the ability of the antiviral proteins, antiviral peptides and conjugates thereof used in the present inventive method to inhibit a viral infection is found throughout the specification, such as in Examples 5 and 6. The antiviral agents used in the present inventive method have been

proven to inhibit cell-to-cell fusion and viral transmission (see, for example, page 21, lines 15-22). Indeed, the antiviral activity of the cyanovirins and conjugates thereof has been demonstrated using the best available assay to determine anti-HIV activity in the specification at page 25, line 26 *et seq*, and in Example 5, for example. Specifically, Example 5 demonstrates that the antiviral proteins and antiviral peptides used in the present inventive method inhibit the cytopathic effects of a virus, HIV-1, upon human cells. Example 6 illustrates the ability of cyanovirins to interrupt initial cell-virus binding. It should be noted that both laboratory and clinical strains of HIV have been shown to be similarly sensitive to cyanovirins, in contrast to other potential anti-HIV proteins, such as CD4.

In spite of the showing set forth in the instant specification and the acceptance of the assay by those of ordinary skill in the art as reasonably productive of utility in a host, the Office contends that the assay presented in the instant application is not an accepted model for a viral infection in a host. The Office, however, has not provided any evidence showing the inaccuracy of the provided assays in predicting *in vivo* utility in a host. Applicants respectfully submit that, because the assay is accepted by those of ordinary skill in the art as reasonably predictive of utility in a host, no further demonstration is required (*see* PTO Examination Guidelines on Utility Requirement, 50 PTCJ at 307, left column).

Moreover, Applicant has, indeed, shown that the antiviral peptides and antiviral proteins used in the present inventive method inhibit a viral infection *in vivo*. The results of an exemplary *in vivo* assay are provided in a Declaration under 37 C.F.R. § 1.132, executed by Dr. Michael R. Boyd and submitted herewith. The results demonstrate that cyanovirins, administered to macaques intrarectally or intravaginally, successfully inhibited a viral infection due to inoculation of SHIV89.6P intrarectally or intravaginally, respectively. The dose of virus administered was shown to induce 100% infectivity in untreated macaques. All treated animals were protected from viral infection, as demonstrated by the absence of viral isolates and viral DNA in blood samples. Thus, the ability of the antiviral peptides and antiviral proteins used in the present inventive method to inhibit a viral infection has been proven in cell assays and in hosts, namely macaques.

The Office has cited Fahey et al. as allegedly teaching that viral infections are refractory to antiviral therapies. The Office has further listed a number of obstacles that allegedly prevent antiviral therapies from effectively treating HIV. Applicant notes that

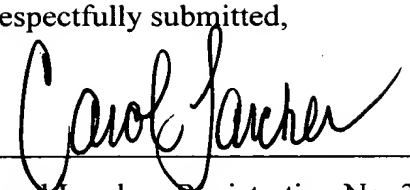
Fahey et al. is primarily directed to immune-based therapies of HIV infection. Many of the therapies proposed by Fahey et al. are directed to the administration of cytokines, growth factors and immune modulators to augment the immune system, which are profoundly different from the method of the present invention. Receptor-directed treatments, namely soluble CD4 and immunoadhesins, are mentioned in the cited reference as not being effective against viral infection. However, Fahey et al. proposes that the inability of the receptor-based therapies to treat infection is due to the differences between laboratory and clinical strains of HIV (see Fahey et al. at, for example, page 3, col. 1, paragraphs 2 and 3). The receptor-based therapies of Fahey et al. were not effective against clinical strains. In contrast, the antiviral agents of the present inventive method are useful in destroying or rendering noninfectious both laboratory *and* clinical strains of HIV. Furthermore, the present inventive method overcomes many of the obstacles cited by the Office as being associated with antiviral therapies. The present inventive method is effective in destroying or rendering non-infectious both laboratory and *all* tested clinical strains of HIV. The presently claimed method is further effective in inhibiting cell-to-cell fusion, another mode of viral transmission. As such, in view of the above and the data provided in the specification and the enclosed declaration, Applicant respectfully submits that no undue experimentation would be required to practice the present invention.

For the above reasons, Applicant submits that the rejected claims are, in fact, enabled. Accordingly, Applicant requests withdrawal of this rejection.

Conclusion

The application is considered to be in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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